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THE DEVELOPMENT OF A TEST OF DEAF CHILDREN'S LINGUISTIC COMPETENCE. FINAL REPORT.

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A PENCIL-AND-PAPER TEST WAS CONSTRUCTED TO STUDY DEAF CHILDREN'S LINGUISTIC COMPETENCE (ABILITY TO PRODUCE AND COMPREHEND THE GRAMMATICAL SENTENCES COMPRISING A LANGUAGE). THE TEST WAS TO REFLECT LINGUISTIC ASPECTS OF A CHILD'S BEHAVIOR, BUT NOT EXTRALINGUISTIC ASPECTS SUCH AS READING AND WRITING. IT CONSISTED OF FIVE SUBTESTS--(1) REPETITION OF SENTENCES, (2) IDENTIFICATION OF NON-SENTENCES, (3) CORRECTION OF NON-SENTENCES, (4) NONVERBAL RESPONSE TO MORPHOLOGICAL AND SYNTACTIC CONTRASTS, (5) CHOICE OF APPROPRIATE SUFFIX. THE TEST WAS GIVEN TO A GROUP OF HEARING SECOND AND THIRD GRADERS AND A GROUP OF DEAF STUDENTS AGED NINE TO 20. PERFORMANCE OF THE TWO GROUPS WAS COMPARED ON SELECTED ITEMS (THOSE PASSED BY AT LEAST 50 PERCENT OF THE SECOND GRADERS AND 75 PERCENT OF THE THIRD GRADERS IN A PRELIMINARY TEST). RESULTS INDICATED THAT THE AVERAGE TOTAL SCORE FOR THE THIRD GRADERS WAS NEARLY PERFECT AND HIGHER THAN THE AVERAGE TOTAL SCORE FOR THE SECOND GRADERS. THE AVERAGE TOTAL SCORE OF THE DEAF GROUP WAS ABOUT THE SAME AS THAT OF THE HEARING SECOND GRADERS. THE TEST AS A WHOLE DID NOT MEET THE CRITERIA OF CONSTRUCT VALIDITY BECAUSE THE SECOND GRADERS DID NOT ATTAIN NEARLY PERFECT SCORES AND SUBSTANTIAL CORRELATIONS BETWEEN TEST AND READING COMPREHENSION SCORES FOR HEARING SUBJECTS WERE OBTAINED. RESULTS SUGGEST THAT LANGUAGE PERFORMANCE OF THE DEAF GROUP DOES NOT DIFFER MARKEDLY FROM THAT OF THE HEARING. FURTHER RESEARCH WAS RECOMMENDED TO DETERMINE WHETHER THE DIFFERENCES BETWEEN THE VERBAL PRODUCTIONS OF DEAF AND HEARING ARE DUE TO SUPERFICIAL DIFFERENCES IN GRAMMATICAL RULES OR TO DIFFERENCES IN RULES OF PERFORMANCE. THE FIVE SUBTESTS AND RELATED DATA ARE PRESENTED. A 24-ITEM BIBLIOGRAPHY IS INCLUDED. (AB)

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Robert L. Cooper and Jonathan D. Kaye

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Lexington School for the Deaf

New York, New York

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Introduction

Problem

The present report summarizes the results of a preliminary attempt to develop techniques for the measurement of deaf children's linguistic competence. By linguistic competence is meant the ability to produce and comprehend, in principle, the infinite set of grammatical sentences comprising a given language (4). An individual's competence is, of course, a construct which must be inferred from his behavior. The test which this report describes was designed to elicit behavior from which inferences about competence could be drawn.[1]

Background

The attempt to construct devices for the measurement of deaf children's linguistic competence represents a departure from traditional investigations of deaf children's language. In general, most researchers in this field have studied aspects of performance which are easily quantifiable but which, as pointed out in a recent review (7), are essentially irrelevant for an assessment of competence: sentence length (12,20,21,22), the proportions of various types of sentence (12), the proportion of different words to total number of words - the type-token ratio (21), the distribution of the parts of speech (20,21,24), scores obtained from conventional, standardized tests of reading comprehension, vocabulary, or "usage" (9,10), and the number of deviations from standard English (20,23).[2]

The irrelevancy, from the point of view of determining competence, of sentence length, proportion of complex sentences, and type-token ratio can be seen from the fact that these indices, when used to describe the performance of hearing children, rise long after

these children have mastered the language. Parts of speech ratios are also unrevealing of competence inasmuch as there is no reason to believe that differences between two speakers' sets of ratios indicate that different grammatical systems underlie their utterances.[3] It is equally evident that conventional standardized achievement tests do not assess linguistic competence. These tests are designed to appraise the secondary language skills which mark the educational progress of schoolchildren who are already competent in the primary skills of comprehending and producing speech.[4] Prior studies of deaf children's deviant utterances have also failed to assess linguistic competence because they have not included attempts to relate the observed deviations to an underlying system, either sui generis or English. Deviations do not necessarily indicate lack of competence since it may be possible to account for them in terms of nonlinguistic factors such as inattention, change in intention, limited memory span, slips of the tongue, etc. Systematic deviations, under conditions which provide specifically designed opportunities for the demonstration of competence, must be found before a different underlying system can be inferred from performance.[5]

For techniques that can be adapted to provide information about deaf children's competence, it is profitable to turn to the work of investigators concerned with eliciting performance from which inferences could be made about young hearing children's language ability. Brown (3), for example, investigated children's recognition of the semantic implications of various grammatical categories by testing his subjects' ability to react appropriately to suffixes attached to nonsense stems. Berko (1) studied children's ability to produce modifications of nonsense words in conformity to the rules of English morphology. Fraser, Bellugi, and Brown (8) tested the ability to identify pictures cued by contrasting sentences, to name pictures by producing the appropriate contrasting linguistic features, and to imitate sentences with contrasting features. Mehler (16) investigated young hearing children's ability to recall sentences varied systematically in syntactic structure. Menyuk evaluated children's ability to repeat sentences representing various transformation types (17) and to correct non-sentences (18).

Purpose

The present investigators have attempted to develop a paper-and-pencil test which might lead to further insights into deaf children's linguistic competence. Because of the obvious difficulties involved in transcribing the speech of deaf children and in accounting for the effects of nonlinguistic variables upon lipreading, such as lighting, speed, and familiarity with the speaker, the attempt has been confined to investigating competence in terms of evidence secured through the subjects' secondary skills of reading and writing. Under these circumstances, the difficulty faced by the investigators was to construct an instrument which would reflect linguistic aspects of a child's behavior but not extralinguistic aspects, such as reading and writing, although the subjects would need some reading and writing ability in order to take the test. The test was designed for deaf children with reading achievement scores equal to at least that of the average hearing child entering the second grade of school.

Method

Subjects

Items for the test were selected after an analysis of the performance of 97 deaf and 96 hearing children on a preliminary version.

Deaf Subjects

The preliminary version was administered to students at the Lexington School for the Deaf in New York City. It was given to all students who met the following criteria: 1) age - 9 years or above; 2) reading comprehension ability, as determined by standardized tests - second grade level or above; 3) hearing loss - at or above 70 dB (I.S.O. as measured for the better ear); 4) age of onset - no later than 18 months; 5) deficits other than deafness (such as cerebral palsy or aphasia) - none; 6) language spoken in the home - English.[6]

The Lexington School draws its students from a wide socioeconomic range, with middle-class students predominating. The method of instruction employed at the school has been described by Groht (11) and is known as the "natural method."

Hearing Subjects

The hearing children who took the preliminary version were students at two parochial schools in New York City. The schools are attached to the same parish church, the majority of whose members are middle-class, although lower as well as afew upper income families are represented. One school is attended by boys, the other by girls. One second grade class and one third grade class were tested in each school. Thus, four classes of hearing children were tested, two of boys and two of girls. The 96 hearing children whose performance was analyzed include only those who took all the subtests administered and whose first language was English.[7]

Specifications for the Preliminary Version

The specifications for the first version, in terms of the substantive content and the type of behaviors to be tested, were determined after a preliminary investigation which included an analysis of written productions secured from students at the Lexington School for the Deaf and an item analysis of scores obtained from Lexington students on a test of English language proficiency designed for foreign students. The written productions were composed in part of story paraphrases obtained by Cohen (5) and in part of unsolicited letters written by students to one of their teachers during several summer vacations. The test was one which was formerly employed to place foreign students in English language courses at Columbia University.

The written materials and the test performance were examined to determine whether deviations from standard English on the part of the deaf children were systematic in any way, that is, whether the deviations clustered only in certain areas (such as agreement of subject and verb or choice of preposition), while other areas were relatively free of deviations.[8] We did not assume that the divergent productions of deaf children and the utterances of speakers of standard English are based on a difference in the grammars which underlie these productions. However, if two different but related grammars do exist (or if a series of idiosyncratic deaf children's grammars exist), the productions of both groups could be expected to differ systematically according to the differences between the grammars.[9] Accordingly, an attempt was made to classify the observed deviations and the incorrectly chosen test options in

terms of English language categories which, if two such grammars or sets of grammars exist, would be most likely to be difficult for deaf children to produce consistently in accordance with the rules of English grammar. These categories were chosen on the basis of their relative difficulty for deaf children, i.e., the relative frequency with which deviations within each category occurred.

The preliminary test was designed to assess knowledge of eight rather vague areas of grammar: articles, tenses, prepositions, word order, agreement, subordination, negation, and active-passive relation.

It was decided to elicit five kinds of behavior from which knowledge of language rules could be inferred: written reproduction of visually presented sentences, identification of non-sentences, correction of deviations in non-sentences, appropriate response to distinctions imposed by formal markers and syntactic patterns, and completion of sentences by selecting among options varying only in their suffixes.

The specifications thus formed a grid of 8x5=40 cells, each cell consisting of items that tapped both a specific area of language and a specific behavior from which knowledge of the former could be inferred.

The weighting assigned each cell, in terms of the number of items written for it, was determined partly by the frequency with which deviations in each substantive category had been observed in the preliminary analysis and partly by the limitations imposed by the formats involved in testing the chosen behaviors.

Preliminary Instruments

For each of the five abilities or behaviors specified one subtest was written. The items of the preliminary instruments are presented in Appendices A-E.

Subtest One

The first subtest was written to assess the ability to reproduce visually presented sentences. It represents an attempt to adapt the method of asking a child to repeat the investigator's utterances (8,17). Correct repetition, i.e., maintenance of the syntactic and morphological features of the sentence without additions or modifications, has been accepted as one type of evidence of competence.

Forty-two sentences were written for the subtest. Each was modelled on a corrected version of deviant sentences observed in the preliminary investigation.

Each sentence was shown, by means of an overhead projector, on a screen. Exposure time was four seconds per sentence. The students were instructed to write down the sentence when the exposure was completed (they were not allowed to write during the exposure) and to look up at the screen after they had finished writing. When all students had finished one item and were looking up at the screen, the next item was presented. The average interval between exposures was about 30 seconds.

Subtest Two

The second subtest consisted of 45 sentences, some of which were grammatical and some of which were deviant. The non-sentences were modelled upon deviant sentences observed in the preliminary investigation. As in the first subtest, the grammatical sentences were modelled on corrected versions of observed, deviant sentences. Students were asked to indicate whether each sentence was grammatical ("right") or not ("wrong").

Subtest Three

Forty deviant sentences, modelled upon those observed in the preliminary investigation, comprised the third subtest. Students were asked to "circle the wrong word" in each sentence and to write, above the circled word, "one word that makes a good sentence."

Subtest Four

The fourth subtest represents an adaptation of a technique developed by Fraser, Bellugi, and Brown (8), who tested the ability of children to comprehend, produce, and imitate ten grammatical contrasts. Contrasts were created by using pairs of utterances, each pair alike except for a specific syntactic pattern or formal marker - for example, the car bumps the train/ the train bumps the car. In that study, comprehension was tested by asking children to point out the one picture in a pair that was identified by a sentence spoken by the experimenter. The pictures in a pair were alike in all respects except for one element or relationship that corresponded to the grammatical contrast being tested.

The present investigators adapted this task by asking subjects to circle the one picture in a pair that was identified by the sentence printed beneath the pair. Subjects were asked to "circle the picture that goes with the words." One contrast per page was tested. The same pair of pictures appeared on the top and bottom halves of a page, the only difference between them being the contrasting sentence printed under each pair.

Comprehension of twelve contrasts was tested - the ten contrasts tested by Fraser, Bellugi, and Brown plus an eleventh grammatical contrast and one lexical contrast. The additional grammatical contrast was that between the direct and indirect object where the distinction is imposed by a prepositinnal phrase.[10] The lexical contrast was between two prepositions, behind and beside.

Each contrast was tested twice, using different pairs of contrasting sentences, with the exception of the contrast between subject and object in the passive voice, which was tested four times. Thus, the test consisted of (11x2) + (1x4) = 26 items. Practice items consisted of matching pictures to sentences which differed in lexical content, e.g., the cat and the mouse/the cat and the dog.

Subtest Five

The final subtest assessed comprehension of nine inflectional and one derivational suffix. Knowledge of each suffix was tested twice. Knowledge of a suffix was tested by presenting an uninflected form in the context of two sentences which were followed by a third, incomplete sentence. The sentence frames were similar to those used by Berko(1). The subjects were asked to "circle the best word for the last sentence." Three of the options consisted of words which differed from the uninflected form by various suffixes. A fourth option was always the same as the original form. For example, "Ann can cook. She did it yesterday. Yesterday she (cooking, cook, cooks, cooked)."

Testing Procedure

For the first subtest, the directions, like the items, were projected on an overhead screen. An examiner pointed to the directions on the screen and at the same time said them aloud. After the exposure of the first practice item had been completed, the examiner wrote the sentence on the blackboard at the

front of the room to illustrate the behavior required by the instructions. When all the subjects had written that item, additonal practice items were presented.

For the other subtests, the directions and practice items, which appeared on the first pages of each test, were copied, greatly enlarged, onto 44"x28" posters, on which the examiner demonstrated the procedures required by the tests. The examiner pointed to the instructions on the poster and at the same time said them aloud. Clear plastic strips were placed over the options of the practice items on the poster so that the examiner could circle the keyed options during the demonstrations.

The instructions for each subtest were administered to deaf and hearing subjects in the same way. The latter, of course, could hear the instructions whereas the former had to read the examiner's lips along with the printed instructions. The subjects were given an opportunity to do several practice items before seeing the keyed responses. The children were not permitted to begin the test until all practice items had been correctly completed and until the examiners were confident that each child understood what to do.

The hearing children took all subtests in their own classrooms. The subtests were administered to them on three days over a ten day period. The first day was devoted to the first subtest. The second and third subtests were given on the second day, and the last two subtests were given on the third day.

The deaf children took all but the first subtest in their own classrooms. The first was administered in a room in which the overhead projector could be conveniently installed. All tests were administered to the deaf subjects within a three week period, with the same testing order being followed as with the hearing children.

All subjects were given as much time as needed to complete each subtest. The second grade hearing children were given a break after approximately every half hour of testing. During this interval, the examiner led them in a game of "Simon Says." All subjects were tested in the fall of 1966.

Scoring

For subtests two and five, scoring proceeded as it would have in a conventional multiple-choice test. An item was scored correct if the keyed option was chosen. In subtest four, each page was scored as a single item. Thus subjects had to choose both keyed options (pictures) on a page for the item to be scored correct.

Subtest One

In the first subtest, a repetition was scored as correct if 1) all the words in the original sentence had been included, 2) the original word order was preserved, and 3) all inflections were preserved. Items were not scored as incorrect because of deviations in spelling, capitalization, or punctuation.[11]

Subtest Three

In the third subtest, each paper was scored according to the number of non-sentences that had been changed into grammatical English. Some items, particularly those testing knowledge of agreement, could be correctly answered in more than one way. For example, They wants to talk could be changed to read He wants to talk or They want to talk. Hence, the student could circle they or wants and then correct the circled word. As in subtest one, responses were not scored as incorrect because of misspellings.

Data Analysis

Items for the final form of the test were selected on the basis of an item analysis of the hearing children's performance on the preliminary form. Test papers were then rescored on the basis of the selected items only. An item analysis of the deaf subjects' performance on the rescored test was made.

Item analyses, rescored subtest intercorrelations, correlations between revised subtest scores and reading achievement scores, and reliability coefficients for the rescored test were computed for four groups: 1) hearing children in grade 2, 2) hearing children in grade 3, 3) deaf children aged 9 to 14 (group I), and 4) deaf children aged 15 to 20 (group II). Average age and reading grade equivalents for these groups are presented, by sex, in Appendix F.

Results

The results of the present investigation are presented in the following order: 1) item analyses of deaf and hearing subjects' performance, 2) comparison of deaf and hearing subjects' performance on the rescored subtests, 3) rescored subtest intercorrelations, 4) correlations between reading scores and revised subtest scores, and 5) internal consistency data for the rescored subtests.

Item Analyses

As there was a reliable difference between the hearing second and third graders' total score on the preliminary version of the test but no significant differences by sex, the percentage of hearing subjects passing each item was computed separately by grade but not by sex.[12]

The investigators had originally hoped to select, for the revised version, only those items that had been passed by at least 90% of the second and third graders. Unfortunately, this was not possible inasmuch as only 25 items met this criterion. A less stringent cut off point was therefore adopted. The items selected were those which were passed by at least 50% of the second graders and 75% of the third graders, after correction for guessing.[13] Eighty-seven items met this criterion. For those items, the average percentage of hearing subjects passing was 78% for the second graders and 92% for the third graders.

An item analysis was made of the deaf subjects' performance on the selected items. The analysis was made on the basis of girls' and boys' combined scores because no reliable differences were found between deaf boys' and girls' total scores on the revised test. For each item, deaf subjects' performance was described in terms of difficulty (percent of subjects passing the item) and discrimination (the degree to which the item distinguishes between subjects with high scores and those with low scores). For each subtest, discrimination (D) was computed in terms of the performance of students attaining scores in the upper and lower thirds of the distribution of scores for that test.[14] Of the 87 items selected, only three were non-discriminating (D = .00 in both deaf groups). The remainder were positively discriminating. The average D index, over all 87 items, was .39 for the younger deaf subjects and .31 for the older deaf subjects.

Appendix G presents the percentage passing the selected items for deaf and hearing subjects and the discrimination indices of these items for the deaf subjects.

Comparison of Deaf and Hearing Subjects on Rescored Subtests

Inasmuch as there was no statistically significant difference by sex for the hearing subjects' performance on the pool from which items were selected, it was reasonable to predict that there would be no difference by sex on the rescored test. This prediction was in fact borne out. There was a statistically significant difference by grade but not by sex.

An analysis of variance of the deaf subjects' performance on the rescored total test was performed. Like the hearing subjects, no difference was found by sex. Unlike the hearing subjects there was no statistically significant difference between the performance of the older and younger groups. These results are presented in Table 1.

Means and standard deviations of the rescored subtests for deaf and hearing subjects are presented in Table 2. For the hearing subjects, the difference between the average total scores of the second and third graders appears to lie primarily in the first and third subtests. The differences between their average scores on the second and fourth subtests, while statistically significant, were quite small, and the difference on the fifth subtest did not reach statistical significance.

The average total score of each of the deaf groups was not significantly different from that of the hearing second graders. On the fourth subtest, the differences among the means of the four groups were minimal, inasmuch as nearly perfect average scores were attained.

Rescored Subtest Intercorrelations

Table 3 presents the intercorrelations between rescored subtests obtained from the performance of deaf and hearing groups. For the deaf subjects, coefficients ranged from .32 to .90, with a median coefficient of .49. For the hearing subjects, these ranged from .27 to .72, with a median coefficient of .53.

Table 1

Analysis of Variance of Deaf Subjects' Total Revised Test Scores

Source of variation	Sum of squares	Degrees of freedom	Mean square	F	F.95
Sex	10.6	1	10.6	1.45	3.95
Group	12.0	1	12.0	1.65	3.95
Error		93	7.3		

Table 2

Summary of Deaf and Hearing Subjects' Rescored Test Performance

Subtest		Hearing Grade 2 (N=39)	Hearing Grade 3 (N=56)	Deaf Group I (N=55)	Deaf Group II (N=42)
1	$\bar{X}$	8.3	11.2	9.2	11.5
	S.D.	3.7	2.5	3.7	1.9
2	$\bar{X}$	19.3	20.6	16.9	17.3
	S.D.	2.4	2.3	2.9	2.7
3	$\bar{X}$	15.3	20.8	13.4	15.6
	S.D.	6.6	2.9	5.4	4.9
4	$\bar{X}$	13.6	14.5	14.0	14.1
	S.D.	2.0	.9	1.3	1.2
5	$\bar{X}$	11.7	13.3	10.8	11.7
	S.D.	3.1	2.0	2.1	2.1
Total	$\bar{X}$	68.1	80.4	64.2	69.5
	S.D.	15.2	7.9	12.7	10.4

Table 3

Intercorrelations of Rescored Subtests

Subtest	Subtest 1	2	3	4	5	1	2	3	4	5
	Deaf Group I(N=55)					Deaf Group II(N=42)				
1		.52	.73	.47	.90		.59	.63	.33[a]	.51
2			.67	.34	.45			.66	.33[a]	.32[a]
3				.48	.55				.47	.67
4					.33[a]					.46
	Hearing Grade 2(N=39)					Hearing Grade 3(N=57)				
1		.71	.69	.48	.56		.37	.46	.46	.48
2			.72	.52	.57			.37	.33	.53
3				.65	.70				.27[a]	.51
4					.65					.54

Note:--All coefficients significant at .01 or above, except as noted.

[a]Significant at .05.

Correlations between Reading Scores and Revised Subtest Scores

Correlations between reading scores and rescored subtests are presented in Table 4. Coefficients are presented separately for hearing boys and girls because the units in which their reading scores were reported could not be combined.[15]

For the deaf subjects, coefficients for the five subtests ranged from .32 to .90 with a median coefficient of .57. Correlations for the hearing subjects ranged from .11 to .82 with a median coefficient of .53. The coefficients for the second grade boys were substantially lower than those of the other hearing groups because of the restricted range of scores yielded by their reading achievement test.

The correlation between the total test score and reading score was .09 for the second grade boys, .60 for the second grade girls, .66 for the third grade boys, .87 for the third grade girls, .66 for the younger deaf children and .77 for the older deaf children.

Internal Consistency Coefficients of the Rescored Test

Kuder-Richardson Formula 20 internal consistency coefficients for each rescored subtest and for total score are presented in Table 5. For the deaf subjects, subtest coefficients ranged from .47 to .89 with a median coefficient of .63. For the hearing subjects, subtest coefficients ranged from .64 to .93 with a median coefficient of .81.

Summary

The average score on the total revised test attained by the hearing third graders was nearly perfect in terms of the percentage of children passing each item. Their performance was significantly better than that of the hearing second graders, whose average score was not significantly different from that attained by either the older or the younger deaf children.

For both deaf and hearing subjects, high rescored subtest intercorrelations and internal consistency coefficients were found, considering the shortness of the individual subtests. Also, for both deaf and hearing subjects, substantial correlations between rescored total test performance and reading achievement scores were observed.

Table 4

Correlations between Rescored Subtest and Reading Scores

Subjects	N	Subtest 1	2	3	4	5	Total
Deaf-Group I	48	.61	.52	.65	.31[a]	.52	.66
Deaf-Group II	37	.67	.64	.77	.30[b]	.50	.77
Hearing Boys Grade 2	15	.20[b]	.23[b]	-.11[b]	.21[b]	.11[b]	.09[b]
Hearing Girls Grade 2	22	.53	.59	.61	.53	.37[b]	.60
Hearing Boys Grade 3	18	.54[a]	-.13[b]	.59	.47[a]	.14[b]	.66
Hearing Girls Grade 3	34	.82	.71	.69	.65	.64	.87

Note:--All coefficients significant at or above .01 except as noted.

[a] significant at .05.
[b] Not significant.

Table 5

Internal Consistency Coefficients, Rescored Subtests (Kuder-Richardson Formula 20)

Subjects	N	Subtest 1	2	3	4	5	Total
Deaf-Group I	55	.89	.62	.88	.47	.63	.93
Deaf-Group II	42	.67	.58	.87	.48	.64	.91
Hearing Grade 2	39	.84	.68	.93	.73	.86	.94
Hearing Grade 3	57	.81	.79	.82	.64	.89	.92

Discussion

What evidence can be sought to determine the validity of the rescored test as a measure of deaf children's linguistic competence? How, in other words, can we assess the degree to which the test measures the trait that it was designed to measure and only that trait? Since the trait is a hypothetical construct, it would seem that the best way to assess the test's validity is to relate performance on the test to criteria which can be predicted on the basis of some notion of the property of the construct. Predictions, that is, can be made about the way in which those who possess the trait should behave and then performance on the test can be related to the predicted behavior.

What evidence, then, can be related to performance on the rescored test to yield evidence of its validity? It seems reasonable to judge the construct validity of the present test, i.e., the degree to which the test represents the hypothetical construct of linguistic competence, according to the extent to which the test yields data conforming to the following criteria:

1. Young hearing children who are reading at or above the second grade level will attain perfect or nearly perfect scores. If the assumption is valid that children have relatively complete linguistic competence in English when they enter school, then nonrandom variation in test score must be due to variations in traits other than linguistic competence.

2. There will be little variation in the scores obtained by young hearing children. If linguistic competence in English is attained by school age, younger school children for example should do as well as older school children on the test. Of course, if the first criterion is met, the second one would be met as well.

3. The correlation between young hearing children's test scores and their reading comprehension scores will be zero. This would of course be true if there were no variation in test score, as a consequence of meeting either the first or the second criterion. If linguistic competence is virtually complete by school age, however, then

variations in school children's reading ability can not be associated with differences in linguistic competence, unless the children are speakers of non-standard dialects. On the other hand, a correlation between hearing children's reading achievement scores and their test scores would suggest that the test was measuring something either in addition to or instead of linguistic competence.

It can be seen at once that the test as a whole did not meet our criteria formulated for construct validity. The hearing second graders received less than perfect scores, the third graders performed significantly better than did the second graders, and there were substantial correlations between test score and reading achievement score for three of the four hearing classes. Even though the average total score of the third graders was nearly perfect (92% of the items correct), there was enough variation in their scores to yield high correlations with reading comprehension.

Although the performance of the hearing subjects in the total rescored test did not meet the desired criteria, their performance on one of the subtests came closer to meeting them. There was only a small (although statistically significant) difference between the second and third graders' performance on the fourth subtest, which yielded nearly perfect average scores. There was, however, still enough variation in the hearing girls' performance on that subtest to yield significant correlations with reading comprehension.

Conclusions

Implications for a Description of Deaf Children's Language

Since the rescored test did not meet our criteria for construct validity, can we make any reasonable inferences about the deaf subjects' language on the basis of their performance on the test? Before answering this question directly, let us try to outline the possible kinds of differences that could be found between the language of the deaf and that of normal speakers of English.

Let us assume that the grammar of a language is composed of rules of various kinds and further that these rules apply in a specified order. Then to say that two languages differ is to say that at some point they have a different rule (or rules). There is some evidence that all languages have a certain number of rules in common. Furthermore, these rules appear to comprise the most basic part of the grammar. These basic rules distinguish human systems of communication from all other kinds. If the assumption of a basic set of common rules is valid, all human languages can be said to be related.

Aside from these universal rules there are many others which make up the grammar of a language. It is these rules which distinguish one language from another. It is clear, without a detailed discussion of such rules, that languages can differ from one another in varying degrees. Thus, Japanese differs more greatly from New York City English than does, for example, Chicago English. The degree of difference is probably related to the number and kind of rules which are different in the two respective grammars.

Finally, the speech of two people or groups of people may differ without the need to assume any difference between their grammars. Thus the speech of a professor addressing a learned society will be quite different from that of a ten-year-old talking to his peers on the playground. In this instance, the difference in speech would not be attributed to different grammars but rather to different rules affecting the linguistic performance of each speaker.

Examples of such performance rules would be social constraints on the use of particular language varieties in particular social situations and constraints imposed by limitations in memory span.

Let us return now to the comparison of the language of the deaf with English. We have outlined three ways in which it might be possible to find differences: 1) the basic set of rules assumed to be present in all human languages could be absent from the language of the deaf; 2) the grammars of English and of the deaf could form two sets of rules that at some point diverged; and 3) the language of the deaf has different performance rules than that of normal speakers of English.

It seems reasonable to assume that the difference between the language of the deaf and of English does not lie in the absence of shared, "universal" rules. To envision a grammar without these rules would be to envision a language strikingly different from any language that has ever been encountered. The language of the deaf shows no such remarkable difference.

Certainly, the performance of the deaf subjects on the present test would not lead one to posit such a difference. On the contrary, the results obtained from the test seem to show a high degree of relatedness between English and the language of the deaf subjects. It should be remembered that the deaf subjects' total scores were, on the average, no different from those of the average second grade hearing subjects. Furthermore, on the one subtest that came closest to meeting our criteria for construct validity, the deaf subjects attained nearly perfect average scores. It seems quite unlikely that the deaf subjects could have attained such scores if a high degree of relatedness between their language and English did not exist.

The deaf subjects' test performance suggests that either they differ from hearing speakers in having a grammar which is different in terms of a few rather superficial rules (i.e., there is a difference, albeit small, in linguistic competence) or that differences exhibited in production can be attributed to differences in rules of performance. Which of these alternatives is chosen could have a profound

effect on the way in which the deaf are taught English. If the deaf do in fact differ in linguistic competence in the way described above, a method based on techniques of foreign language teaching would be justified. However, if the difference is purely a question of linguistic performance, little success could be expected until such rules are discovered and treated accordingly.

Recommendations

Although the present test did not meet our criteria for construct validity, it seems likely that it can serve as a useful prototype for one which will come closer to this goal. Continued research effort ought to bring this aim within reach and thus should enable investigators to learn more about the linguistic abilities of deaf children.

At least two issues require further attention. The first question which should be asked concerns the nature of the difficulties encountered by the hearing second and third graders in their test performance. Oral administration to young hearing children will help answer this question. Once it is possible to determine the extralinguistic factors causing variation in test performance, we will be closer to our goal of building a test yielding relatively uncontaminated data on linguistic competence. It should be remembered that although a nearly perfect average score was not obtained from the second graders, their average score was still relatively high. Thus, the goal of building a test on which performance does not depend upon extralinguistic factors such as reading comprehension (once a minimum level of comprehension has been attained) does not seem impossibly distant.

The second question concerns the difficulties encountered by the deaf subjects on the test. Just as it is desirable to build a test whose items do not tap extralinguistic skills when it is administered to young children, it is also desirable to construct items which maximally discriminate between deaf ~~and~~ hearing children of high and low competence in English. Accordingly, the items on the present test should be analyzed in terms of the linguistic properties of those items which were most discriminating for the deaf children. What is necessary is a careful linguistic analysis of the sentences which served as stimuli to determine whether certain structures discriminated in

the same way across subtests. In addition, a linguistic analysis of the deviant productions observed in the first and third subtests ought to be performed in order to determine 1) whether these deviations can be accounted for by a small set of rules which differ from those of standard English and 2) whether, if such a set can be inferred, they could account for errors on the other subtests as well.

The rewards of these lines of endeavor need not be elaborated. Inasmuch as the attainment of language is the principal outcome sought by most educators of the deaf, the means for assessing the realization of this goal would be of practical consequence. Aside from the obvious, immediate administrative uses of such devices and their value in permitting a more valid evaluation of alternative instructional methods, they could provide needed information about the substantive nature of deaf children's knowledge of language. Indeed, without such data, remediation can proceed on little more than an intuitive, if not random, basis.

Summary

A paper-and-pencil test was constructed in an attempt to study deaf children's linguistic competence. The test was composed of five subtests which represented adaptations of tasks which have been used to study the language of young hearing children: repetition of sentences, identification of non-sentences, correction of non-sentences, nonverbal response to morphological and syntactic contrasts, and choice of appropriate suffix.

Approximately 200 students were tested: half were hearing second and third graders. The other half were deaf students aged 9 to 20. Deaf and hearing subjects were compared in terms of their performance on those items which had been passed by at least 50% of the second graders and 75% of the third graders, after correction for guessing.

On the selected items, the average total score attained by the third graders was nearly perfect and was significantly higher than that of the second graders whose average score was about the

same as that of the deaf subjects. The rescored test did not meet the criteria of construct validity set for it, inasmuch as the second graders did not attain nearly perfect scores and substantial correlations between test and reading comprehension scores were observed for the hearing subjects.

The deaf subjects' performance suggests that their language does not deviate markedly from those of hearing speakers of English. Further research is needed to determine whether the differences between deaf and hearing speakers' verbal productions are due to relatively superficial differences in grammatical rules or to differences in rules of performance.

Notes

1. It is to be understood that the terms grammar, grammatical, etc. do not refer to any existing description, as might be found, for example, in a textbook, but rather to the system which we infer to be present in the mind of any speaker in order to account for his linguistic behavior.

It is important to distinguish between competence in English and the competence which enables a deaf child to produce utterances which are neither random nor rote. If he can produce such utterances, he possesses a system of rules and therefore linguistic competence, i.e., he can produce and understand utterances generated by that system. Whether idiosyncratic or shared, however, his competence may not be identical to that of the adult speaker of English any more than is the competence of a two-year-old or of a student of English as a second language. In the present report, the term competence, unless otherwise specified, refers to competence in English.

2. There have been a few investigators of deaf children's language who have abandoned the quantitative tradition. See, for example, (5,6,14).

3. Although sentence length, proportion of complex sentences, type-token ratio, and parts of speech ratios are irrelevant indices for the description of linguistic competence, they may be helpful as indicators of differences in the ability to use language appropriately in certain types of social situation. There are situations, for example a university seminar, in which speakers need the ability to use relatively longer and more complex sentences which employ a lower proportion of stereotyped responses and a higher proportion of qualifiers. A speaker without this ability has difficulty in participating in social situations which demand such usage. It is plausible, however, that what causes this difficulty is not lack of linguistic competence but, instead, the procedures he has learned for selecting linguistic alternates. For a discussion of the development of different selection procedures, see (2).

4. Although it is true that the test performance of children speaking non-standard dialects may suffer, the contribution to test performance of linguistic (as opposed to functional) differences between standard and non-standard dialects is unclear. In any event,

these differences are not systematically exploited by the tests.

5. Even such instances in themselves, however, do not constitute sufficient evidence to posit different underlying systems. One can envisage extralinguistic factors, as for example a high noise-signal ratio, operating on a speaker in such a way as to produce deviations from standard English in quite systematic ways.

6. The parents of some children may have used sign language at home. Where speech was employed in the home, however, the language was English.

7. Some attrition was also caused by an error in test administration. The results of five second grade boys, who inadvertently were not given enough time to finish one of the subtests, were not included.

8. It should be emphasized that no conclusions concerning the linguistic competence of the deaf children were based on these data, which were used only to suggest areas which might be worth testing in a more comprehensive way.

9. Note the importance of related in this sentence. Two different and unrelated grammatical systems will produce utterances which, of course, differ from each other. However, that this difference is systematic is not at all obvious unless one assumes a universal theory of language on which all grammars are based. In that case, the differences between productions of all languages would be systematic in some sense. We are assuming that if the system of deaf children and of speakers of standard English are different, they are at least related. For a discussion of different but related grammatical systems, see (13).

10. For example, the girl shows the dog to the cat. Fraser, Bellugi, and Brown tested knowledge of the direct object/indirect object contrast as marked by word order, e.g., the girl shows the cat the dog.

11. Problems arose, of course, in judging whether a word constituted a misspelling or an incorrect repetition. In general, if the new spelling did not create a correctly spelled, different word, it was viewed not as an incorrect repetition but as a

misspelling and thus as acceptable. For example, rian (for rain) and evry (for every) are not correctly spelled words and were thus considered as misspellings. Where a correctly spelled, different word was written (e.g., want for went or we for he), it was viewed as an incorrect repetition and thus as unacceptable. However, if the correctly spelled, different word sounded like the original (e.g., wear for where or here for hear) or could be construed to sound like the original by assigning to a letter a sound value it commonly takes in other letter combinations (e.g., cot for coat or wit for white) it was counted as an incorrect spelling and therefore as acceptable. The few times where scorers were unable to agree, the issue was resolved in favor of the subject by accepting the word as a misspelling.

12. An analysis of variance of hearing subjects' scores on the preliminary and revised tests was not possible because the hypothesis of equality of variance of the second and third graders' scores was not supported. Differences between means of hearing grade and sex groups were computed by the t-test. For the deaf subjects, however, it was possible to test these differences by an analysis of variance.

13. Items were corrected for guessing by applying the formula $P = R - \frac{\left(\frac{W}{n-1}\right)}{N}$, where P = per cent passing item after correction for guessing, R = number subjects passing item, W = number subjects not passing item, n = number options in the item, and N = total number of subjects taking the test.

The items in subtest two were treated as two-option items. The items in subtest four could have been viewed as having either two options or four options. Fraser, Bellugi, and Brown (8) argued for the latter interpretation because their subjects seemed to treat the pairs in each set of two pairs as independent. The subjects in the present investigation, however, perhaps because they were older, did not seem to treat the pairs independently. Thus, with rare exceptions, if option A were chosen in the pair at the top of the page, option B was chosen in the pair at the bottom. For this reason, the items in the fourth subtest were viewed as two-option items when correcting for guessing. The items in subtest

five were treated as four-option items. No correction for guessing was necessary in the first and third subtests since the subjects had to supply their own responses instead of selecting among alternatives.

For items in subtests two, four, and five to have been passed by 50% of the second graders and 75% of the third graders after correction for guessing, the following percentages of second and third graders, respectively, had to have passed each item before correction for guessing: in the second and fourth subtests - 75% and 87.5%, in the fifth subtest - 62.5% and 81.3%.

14. The discrimination index was calculated by means of the formula $D = \frac{Ru-Rl}{1/3N}$ where Ru = number of students with scores in the upper third of the distribution of scores for the subtest who passed the item; Rl = number of students in the lower third passing the item; and N = total number of students taking the test.

15. The hearing second grade boys' reading achievement scores were obtained from a test which typically yields lower grade equivalent scores than does the test administered to the girls. The hearing third grade boys' scores were reported as percentiles.

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APPENDIX A:--SUBTEST ONE, PRELIMINARY FORM

Directions

You will see a sentence.
READ the sentence.
WAIT for the sentence to go away.
WRITE the sentence you saw.
LOOK UP for the next sentence.

Practice items

1. He is fat.
2. Good morning.
3. She is happy.
4. She is tall.
5. We went home.
6. He is ten.
7. He ran fast.
8. I saw a dog.

Item, subtest one

* + 1. We can read.
2. We're not going.
* 3. He told me what to do.
4. They have never been there.
5. He plays here every day.
6. I see John's coat.
7. It's in front of you.
8. We'll go home if it rains.
9. Thanks for helping me.
* +10. We go there every day.
* +11. I know who he is.
* +12. He is working now.
13. The cats are washing themselves.
14. He is the oldest boy in school.
15. The boy who lives here is ten.
* +16. Give it back to me.

Item, subtest one (continued)	
17.	He was crying because he banged his head.
18.	We are waiting for him.
19.	What do you think he did?
20.	He went home yesterday.
21.	He lived near me last year.
22.	Do you know how to do it?
23.	He was given a book.
* + 24.	They let him go.
* + 25.	They have a big white dog.
* + 26.	We live in New York.
27.	We talked about it yesterday.
28.	We met him at night.
29.	We saw her on the street.
30.	They like to sing.
31.	He is eating an apple.
32.	We walked there last week.
33.	We will do it later.
34.	The cups have water in them.
* + 35.	Where is he now?
* + 36.	They have two cats.
37.	No one lives there any more.
* + 38.	I have something to do.
39.	His tie is blue.
* + 40.	They want a dog.
41.	They don't work here now.
42.	He was hit by a ball.

* Passed by at least 50% of the hearing second graders and 75% of the hearing third graders.

+ Passed by at least 50% of one deaf group and 75% of the other.

APPENDIX B:--SUBTEST TWO, PRELIMINARY FORM

Directions

Read the sentence.
If the sentence is right, circle RIGHT.
If the sentence is wrong, circle WRONG.

Practice items

1.	He nice.	RIGHT	WRONG
2.	She is good.	RIGHT	WRONG
3.	He has two car.	RIGHT	WRONG
4.	He go yesterday.	RIGHT	WRONG
5.	The cat is black.	RIGHT	WRONG
6.	She has a dog.	RIGHT	WRONG

Item, subtest two

	1.	They have dog.	RIGHT	WRONG
	2.	I talk to him yesterday.	RIGHT	WRONG
	3.	We do it on this way.	RIGHT	WRONG
	4.	Nothing hasn't changed.	RIGHT	WRONG
	5.	She is the youngest girl here.	RIGHT	WRONG
	6.	We had a good times.	RIGHT	WRONG
	7.	She went to Mary's house.	RIGHT	WRONG
*	8.	They like to read.	RIGHT	WRONG
*	9.	Those boys went home.	RIGHT	WRONG
	10.	They live in a large red house.	RIGHT	WRONG
	11.	I'm looking forward to it.	RIGHT	WRONG
	12.	He worked hard.	RIGHT	WRONG
	13.	She live here.	RIGHT	WRONG
*	14.	He's outside.	RIGHT	WRONG
	15.	She went there in a few days ago.	RIGHT	WRONG
	16.	We hope seeing you soon.	RIGHT	WRONG
	17.	He wanted eat.	RIGHT	WRONG
	18.	They have some letters to write.	RIGHT	WRONG
	19.	Isn't he here yet?	RIGHT	WRONG
	20.	I didn't go to school.	RIGHT	WRONG
	21.	It's about three o'clock.	RIGHT	WRONG
	22.	They saw two cat.	RIGHT	WRONG

Item, subtest two (continued)

* + 23.	They live in New York	RIGHT	WRONG
* + 24.	He saw an old man.	RIGHT	WRONG
* 25.	They are belonged together.	RIGHT	WRONG
* 26.	He sat the grass.	RIGHT	WRONG
* + 27.	Why did you do that?	RIGHT	WRONG
* 28.	We're going on a trip.	RIGHT	WRONG
29.	I have never seen her.	RIGHT	WRONG
* 30.	What did you do tomorrow?	RIGHT	WRONG
* 31.	What's her name?	RIGHT	WRONG
* 32.	He was surprised it.	RIGHT	WRONG
* 33.	I go there last year.	RIGHT	WRONG
* 34.	I have time to play.	RIGHT	WRONG
35.	He can to play.	RIGHT	WRONG
36.	The girls who live here is nice.	RIGHT	WRONG
37.	They want one.	RIGHT	WRONG
* + 38.	We have to work now.	RIGHT	WRONG
39.	He isn't here.	RIGHT	WRONG
40.	He like New York.	RIGHT	WRONG
* 41.	He told about them it.	RIGHT	WRONG
42.	They are my friend.	RIGHT	WRONG
43.	This is a book that I like it.	RIGHT	WRONG
* + 44.	They know how to read.	RIGHT	WRONG
* 45.	He ran away to back his house.	RIGHT	WRONG

*Passed by at least 75% of the hearing second graders and 87.5% of the hearing third graders.

+ Passed by at least 75% of one deaf group and 87.5% of the other.

APPENDIX C:--SUBTEST THREE, PRELIMINARY FORM

Directions

READ the sentence.
One word is wrong in the sentence.
FIND the wrong word.
CIRCLE the wrong word.
WRITE one word that makes a good sentence.

Practice items

1. Dogs have two ear.
2. She hat is blue.
3. He plays yesterday.
4. He are fat.
5. He eyes are blue.
6. We work yesterday.

Item, subtest three

* 1. He is my friends.
    2. It was my best news I ever heard.
* 3. I'll see her some other times.
* 4. He sat to a chair.
* + 5. They wants to talk.
    6. She can't read the book because it was too hard.
* 7. Here are some good apple.
    8. I know which to go.
    9. I am happy to it.
   10. It is a last day of classes.
   11. I have been busy for a past two months.
   12. I was carried some boxes.
   13. He should have wait.
   14. He wants the book with the pictures in them.
   15. She didn't buy nothing.
* +16. He feet were cold.
* 17. He wants to seeing them.
* +18. We need some book.
* +19. He found Mary coat.

Item, subtest three (continued)		
*	20.	She has going to school.
	21.	I live to the sea.
*	22.	One of the girl told him.
*	23.	She lives on the next house.
	24.	I'm going to go with plane.
	25.	No one never saw her.
*	26.	I asked where time it was.
*	27.	We were walk home.
* +	28.	He goes home yesterday.
* +	29.	We read all the book.
	30.	I'm surprised to you.
* +	31.	Those boys is tall.
*	32.	She is work now.
	33.	I met a friend that we played together.
* +	34.	She walk there last week.
*	35.	She did a bad things.
	36.	He is not used to study.
* +	37.	We work hard yesterday.
* +	38.	She has two dog.
*	39.	Every boys plays ball.
	40.	Thank you for visit us.

* Passed by at least 50% of the hearing second graders and 75% of the hearing third graders.

+ Passed by at least 50% of one deaf group and 75% of the other.

APPENDIX D:--SUBTEST FOUR, PRELIMINARY FORM[a]

Directions

READ the words.
LOOK at the pictures.
CIRCLE the picture that goes with the words.

[a] Adapted from a procedure developed by Fraser, Bellugi, and Brown (8).

Practice items

1. the thin man/the fat man
2. the cat and the mouse/the cat and the dog
3. the girl with the small hat/the girl with the big hat
4. the boy with the white dog/the boy with the black dog

Item, subtest four

1. The boy is sitting/The boy is not sitting
2. The baby is climbing/The baby will climb
3. The boy hits the ball/The ball hits the boy
4. The girl shows the cat the dog/The girl shows the dog the cat
5. The paint is spilling/The paint spilled
6. The daddy is kissed by the mommy/The mommy is kissed by the daddy
7. Their dog/Her dog
8. The boy is behind the tree/The boy is beside the tree
9. The deer are running/The deer is running
10. a dap/some mog
11. The boy brings the fish to the bird/The boy brings the bird to the fish
12. The car bumps the train/The train bumps the car
13. The kitten plays/The kittens play
14. The girl is cooking/The girl is not cooking
15. The girl will drink/The girl is drinking
16. The dog is chased by the cat/The dog chases the cat

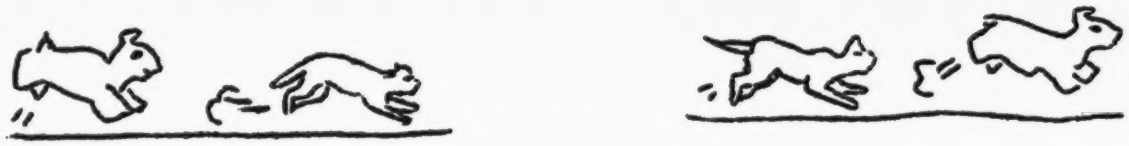
Item, subtest four (continued)
17. The boy brings the fish the bird/The boy brings the bird the fish
18. The boy jumped/The boy is jumping
19. The train is bumped by the car/The car is bumped by the train
20. Their wagon/His wagon
21. The cat is behind the chair/The cat is beside the chair
22. The sheep are eating/The sheep is eating
23. some pim/a ked
24. The girl shows the dog to the cat/The girl shows the cat to the dog
25. The daddy kisses the mommy/The mommy kisses the daddy
26. The boys draw/The boy draws

Note:--All items were passed by at least 75% of the hearing second graders and 87.5% of the hearing third graders. All items except no. three were passed by at least 75% of one deaf group and 87.5% of the other.

Sample item, subtest four (No. 16)

Circle the picture that goes with the words.

The dog is chased by the cat.



The dog chases the cat.

APPENDIX E:--SUBTEST FIVE, PRELIMINARY FORM

Directions

Read all the sentences.
Circle the best word for the last sentence.

Practice items

1. John likes his cat.
   Mary likes her cat.

   They like their (cats. / catty. / cattier. / cattiest.)

2. John goes to school.
   Mary goes to school.

   Yesterday they (go / goes / going / went) to school.

3. John washed his car.
   Mary washed her car.

   They washed (his / her / their / our) cars.

4. Mary likes her dog.
   John likes his dog.

   They like their (doggier. / doggiest. / dogs. / dogged.)

Practice items (continued)

5. Mary goes to work.
   John goes to work.

   Yesterday they { went / go / goes / going } to work.

6. Mary is washing her dog.
   John is washing his dog.

   They are washing { our / his / her / their } dogs.

Item, subtest five

* + 1. Ann can cook.
   She did it yesterday.

   Yesterday she { cooking. / cook. / cooks. / cooked. }

* + 2. Mary can read.
   She is doing it now.

   Now she is { read. / reading. / readed. / reads. }

Item, subtest five (continued)

* + 3. Mary has a dog.
She wants one more.

dogging.
doggier.
She wants two
dog.
dogs.

* + 4. The bear has a short tail.

bear
bear's
The tail is short.
bearing
bearer

* 5. Ann can cook.
She knows a lot about it.

cook.
cooked.
She knows a lot about
cooking.
cooker.

6. The cow has spots.
The horse has more spots.
The dog has the most spots.
They are all spotty.

spottiest
spotty
The dog is the of all.
spottier
spot

* + 7. Mary made a wish.
Then she made another one.

wish.
wished.
She made two
wishes.
wishing.

Item, subtest five (continued)

* 8. Tom can <u>fish</u>.
He does it every summer.

Every summer he
- fish.
- fishes.
- fishing.
- fisher.

9. The meat has <u>salt</u> on it.
The fish has more <u>salt</u> on it.
They are both <u>salty</u>.

The fish is
- saltiest
- saltier
- salty
- salt

than the meat.

* 10. Sue can <u>swim</u>.
She does it every summer.

Every summer she
- swims.
- swim.
- swimming.
- swimmer.

11. John knows how to <u>hunt</u>.
He did it last year.

Last year he
- hunted.
- hunts.
- hunt.
- hunting.

* + 12. Joe knows how to <u>jump</u>.
He is doing it now.

Now he is
- jumping.
- jumped.
- jump.
- jumps.

Item, subtest five (continued)

* + 13. John saw a cow.
Then he saw another one.

cow.
cows.
He saw two
cowed.
cower.

* + 14. The horse has black feet.

horse's
horse
The feet are black.
horsing
horsed

* 15. Mary knows how to sing.
She reads a lot about it.

sing.
singer.
She reads a lot about
singing.
sings.

16. The white sheep has wool.
The brown sheep has more wool.
The black sheep has the most wool.
They are all wooly.

wool
wooly
The black sheep is the sheep of all.
woolier
wooliest

* + 17. John broke a glass.
Then he broke another one.

glass.
glassed.
He broke two
glassing.
glasses.

Item, subtest five (continued)

* 18. Mary knows how to dress herself.
She does it every day.

Every day she
- dresser
- dress
- dresses
- dressing

herself.

19. The small hill has grass on it.
The big hill has more grass on it.
They are both grassy.

The big hill is
- grass
- grassy
- grassier
- grassiest

than the small hill.

20. John knows how to sail.
He does it every summer.

Every summer he
- sailing.
- sail.
- sailor.
- sails.

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* Passed by at least 62.5% of the hearing second graders and 81.3% of the hearing third graders.

+ Passed by at least 62.5% of one deaf group and 81.3% of the other.

APPENDIX F:--AGE AND READING GRADE EQUIVALENTS[a] OF DEAF AND HEARING SUBJECTS

Variable	Hearing				Deaf			
	Grade 2		Grade 3		Group I		Group II	
	M	F	M	F	M	F	M	F
Age $\bar{X}$	7.3	7.5	8.5	8.6	12.8	12.8	16.7	17.3
S.D.	.3	.5	.4	.4	1.6	1.5	1.2	1.5
N	17	22	18	38	25	30	9	33
Reading Grade Equiv. $\bar{X}$	2.0	2.6	b	4.4	3.8	4.1	4.3	4.8
S.D.	.2	.5	b	.9	.8	1.6	1.2	1.1
N	15	22	18	34	21	27	8	29

[a] Reading scores obtained in spring of 1966 except for hearing second grade boys, whose scores were obtained in fall of 1966. The test taken by the second grade boys typically yields lower grade equivalent scores than does that taken by the second grade girls.

[b] Scores reported as percentiles of normative sample of New York State third graders. The average percentile obtained by the third grade hearing boys was 63 . . . (S.D. = 23).

APPENDIX G:--DEAF AND HEARING SUBJECTS' PERFORMANCE ON SELECTED ITEMS

	Hearing		Deaf			
	Grade 2 (N=39)	Grade 3 (N=56)	Group I (N=55)		Group II (N=42)	
Item	% pass.	% pass.	% pass.	Disc.	% pass.	Disc.
Subtest One						
1	79	95	96	.11	100	.00
3	64	86	45	.67	71	.71
10	72	81	65	.67	86	.21
11	72	84	53	.94	76	.57
12	72	89	85	.39	98	.00
16	56	89	56	.95	83	.36
24	59	91	73	.83	91	.29
25	56	75	63	.78	83	.43
26	56	88	89	.28	95	.14
35	62	88	65	.67	88	.21
36	69	81	73	.56	93	.21
38	56	88	75	.67	86	.43
40	56	83	86	.39	95	.14
Subtest Two						
1	90	95	76	.33	88	.21
7	90	95	96	.11	98	.07
8	100	98	91	.28	86	.29
9	87	88	71	.22	71	.36
14	77	88	64	.56	71	.07
17	87	89	93	.22	91	.21
20	77	89	82	.00	98	.07
23	97	97	96	.11	88	.07
24	100	98	91	.06	98	.07
25	85	95	40	.28	50	.50
26	77	93	73	.50	67	.36
27	87	97	84	.28	88	.29
28	82	89	85	.17	86	.21
30	85	91	46	.61	41	.43
31	90	95	82	.11	86	.29
32	90	100	56	.56	43	.64
33	80	93	76	.28	74	.29
34	82	98	82	.33	86	.14
38	92	88	93	.17	93	.21
41	87	93	73	.33	83	.36
44	95	95	85	.28	93	.21
45	90	95	53	.67	55	.57

continued

APPENDIX G (continued)

Item	Hearing Grade 2 (N=39) % pass.	Hearing Grade 3 (N=56) % pass.	Deaf Group I (N=55) % pass.	Deaf Group I (N=55) Disc.	Deaf Group II (N=42) % pass.	Deaf Group II (N=42) Disc.
Subtest Three						
1	92	97	46	.83	71	.50
3	79	97	36	.72	52	.64
4	69	88	60	.56	74	.64
5	85	97	65	.72	76	.50
7	59	93	58	.61	57	.50
16	51	91	67	.61	79	.57
17	77	95	69	.50	69	.43
18	59	97	71	.56	88	.29
19	67	92	75	.44	86	.43
20	69	86	38	.78	59	.36
22	51	93	27	.56	50	.57
23	69	83	35	.28	26	.21
26	67	89	53	.78	69	.57
27	56	84	60	.56	64	.71
28	72	89	80	.39	83	.36
29	54	84	65	.56	79	.50
31	54	91	56	.78	76	.50
32	72	95	62	.61	69	.64
34	62	83	84	.44	86	.36
35	69	93	27	.61	50	.86
37	51	86	91	.28	88	.21
38	79	91	96	.17	100	.00
39	67	91	07	.22	05	.07
Subtest Four						
6	95	100	100	.00	100	.00
7	90	100	95	.11	98	.07
8	92	98	91	.22	71	.57
9	90	91	91	.11	88	.29
10	87	97	89	.22	88	.36
12	97	100	98	.06	100	.00
16	92	100	100	.00	100	.00
19	95	100	100	.00	98	.07'
20	92	95	98	.06	95	.14
23	77	88	82	.50	91	.21
25	100	98	95	.17	100	.00
26	92	100	87	.33	93	.14
27	85	89	85	.33	98	.07
30	92	98	96	.00	98	.00
31	79	93	91	.22	91	.28

continued

APPENDIX G (continued)

Item	Hearing Grade 2 (N=39) % pass.	Hearing Grade 3 (N=56) % pass.	Deaf Group I (N=55) % pass.	Deaf Group I (N=55) Disc.	Deaf Group II (N=42) % pass.	Deaf Group II (N=42) Disc.
Subtest Five						
1	87	93	91	.22	95	.07
2	95	97	87	.50	81	.29
3	95	97	100	.00	98	.14
4	69	91	89	.17	88	.29
5	92	98	62	.61	59	.64
7	85	95	96	.11	98	.07
8	79	93	33	.67	43	.86
10	67	93	47	.67	67	.64
12	90	98	82	.50	86	.29
13	95	100	100	.00	100	.00
14	77	93	98	.06	91	.21
15	87	93	40	.56	31	.57
17	69	98	93	.22	95	.00
18	79	93	58	.44	76	.57